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EXAMINER

MCNELIS, KATHLEEN A

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1742

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,003

Applicant(s)

SUNDSTROM, JOHAN

Examiner

Kathleen A. McNelis

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 30, 32-75 and 79-82 is/are pending in the application.
- 4a) Of the above claim(s) 58-75 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 30, 32-56, and 79-82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

Claims Status

Claims 30, 32-75 and 79-82 remain for examination wherein claims 31, 49 and 50 are amended, claims 57-75 are withdrawn and claims 79-82 are new.

Status of Previous Rejections

New rejection grounds have been applied in view of the following amendments to the claims:

The incorporation of depending claims 31 and 49 into claim 30 and the amended requirement that the steel turning scrap be finely divided necessitated withdrawing of the rejection under 35 U.S.C. 102(b) applied to claims 30-33, 36, 38, 40, 41, 48 and 56 and applying the rejection under 35 U.S.C. 103(a) formerly applied to depending claim 49. Where depending claims were also amended, amendments to the rejection grounds are addressed below. The rejection grounds for depending claims that were not amended are the same as in the 01/10/2007 Office action, but are repeated below for the sake of completeness.

The addition of new claims 79-82 necessitated new rejection grounds.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 30, 32, 33, 36, 38-42, 48-52, 56 and 79-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955).

With respect to claims 30 and 56, GB '955 discloses a method for producing high purity pulverized iron-based powder by nitriding thin steel scrap in the presence of ammonia gas, pulverizing the nitrided steel to a desired particle size and denitriding the pulverized product (p. 1

Art Unit: 1742

lines 75-82) to obtain a powder (p. 2 lines 1-13), where steel scrap is an iron based, fragmented raw material.

Regarding the amended limitation to claim 30 that the raw material is chosen from at least one of the material groups consisting of iron powder, sponge iron, iron oxide powder, steel powder and finely divided steel turning scrap (limitation formerly in claim 31), although GB '955 does not specifically recite that finely divided steel turning scrap is treated by the invention, GB '955 discloses nitriding steel sheet scrap in general, therefore finely divided steel turning scrap is within the scope of the disclosure.

Regarding the amended limitation to claim 30 that the denitriding is performed at a temperature range of between 250 and 400 °C (limitation formerly in claim 49), GB '955 discloses denitriding at a temperature of above 700 °C (p. 2 lines 1-14) which is above the ranges claimed in the instant invention. However, evidence has not been provided in the instant disclosure regarding the criticality of the denitriding temperature of 250 to 400 °C. It is well settled that where the principal difference between a claimed process and that taught by reference is a temperature difference, it is incumbent upon applicants to establish the criticality of that difference (Ex parte Khusid, et al., 174 USPQ 59).

With respect to claim 32, GB '955 discloses an example where the nitriding is performed at 750 °C (p. 2 lines 20-33), which is within the range of 400 to 800 °C.

With respect to claim 33, GB '955 discloses an example where the nitriding is performed at 700°C (p. 2 lines 34-48), which is within the range of 500 to 700 °C.

With respect to claim 36, GB '955 discloses production of powder size -100 mesh (p. 2 lines 20-44) (i.e. < 0.15 mm), which is within the claimed range of micron size (i.e. < 150 µm).

Art Unit: 1742

With respect to claim 38, GB '955 discloses examples of batchwise treatment (p. 2 line 20-44).

With respect to claim 39 GB '955 discloses examples of batchwise production as discussed above regarding claim 38. Making a process a continuous is prima facie obvious in the light of a batch process taught by prior art (see M.P.E.P. 2144.04 (V) (E)).

With respect to claims 40 and 41, GB '955 discloses sieving to -100 mesh (p. 2 line 20-44), which separates particles of a desired particle size interval.

With respect to claim 42, although not recited in GB '955, one of ordinary skill in the art would expect that the milling (i.e. pulverizing) and separation (i.e. sieving) steps are performed dry, since GB '955 does not teach the addition of liquid and further because sieving produces a powder.

With respect to claim 48, GB '955 discloses the use of hydrogen for denitrifying gas (p. 1 lines 9-20).

With respect to claims 49 and 50, GB '955 discloses denitrifying at a temperature of above 700 °C (p. 2 lines 1-14) which is above the ranges claimed in the instant invention. However, evidence has not been provided in the instant disclosure regarding the criticality of the denitrifying temperature of 300 to 350 °C (claim 49) or 300 to 350 °C (claim 50). It is well settled that where the principal difference between a claimed process and that taught by reference is a temperature difference, it is incumbent upon applicants to establish the criticality of that difference (Ex parte Khusid, et al., 174 USPQ 59).

With respect to claims 51 and 52, GB '955 discloses pulverizing and sieving to produce a powder sized -100 mesh as discussed above regarding claim 30. The range of -100 mesh (i.e. < 150 µm) overlaps the claimed range of 1 to 50 µm (claim 51) and 3 to 25 µm (claim 52). It would

Art Unit: 1742

have been obvious to one of ordinary skill in the art at the time the invention was made to produce powders of 1 to 50 μm or 3 to 25 μm in view of the broader disclosed range of $< 150 \mu\text{m}$.

With respect to new claims 79-82, GB '955 discloses an example where the steel scrap is 0.5 mm (i.e. 500 μm) thickness (p. 2 lines 20-33), therefore the particle size is within the range of 50 to 500 μm .

Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) alone or in further view of Japanese patent 55-164019 (JP '019).

GB '955 is applied as discussed above regarding claim 30.

With respect to claims 34 and 35, while GB '955 does not recite that the nitride material has a nitrogen content of about 3 to 20% (claim 34) or more than 6% (claim 35), such would be expected since the process of nitriding steel with ammonia is essentially the same as the invention recited in instant claims 30 and 31, and since operating temperatures disclosed by GB '955 are within ranges in instant claims 32 and 33.

Alternatively, GB '955 does not recite that the nitride material has a nitrogen content of about 3 to 20% (claim 34) or more than 6% (claim 35).

JP '019 discloses a method for producing a nitrided iron powder by reducing iron powder in a furnace and heating in the presence of ammonia to obtain a product of 1.0 to 10.5 wt% N. Since the method and operating temperatures of JP '019 is similar to that of GB '955, one of ordinary skill in the art would expect similar results. The range of 1.0 to 10.5 wt% overlaps the claimed ranges of 3 to 20% (claim 34) or more than 6% (claim 35), therefore a prima facie case of obviousness exists (M.P.E.P § 2144.05).

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of Carey et al. (U.S. Pat. No. 4,154,608).

Art Unit: 1742

GB '955 is applied as set forth regarding claims 30 and 36 above.

GB '955 does not disclose that milling is preformed using a ball or jet mill as in instant claim 37.

Carey et al. discloses a method for producing high purity iron powder (abstract) wherein the powder is ground to desired size using conventional grinding equipment such as a ball mill which enables the operator to adjust the particle size to any mesh (col. 5 lines 1-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a ball mill as taught by Carey et al. to comminute the material in GB '955 since Carey et al. teaches that this allows to the operator to adjust the particle size to any mesh and is suitable for production of high purity iron.

Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of Muller et al. (1999).

GB '955 is applied as set forth regarding claims 30 and 40 above.

GB '955 does not disclose that milling is preformed using wet milling as in instant claim 43.

Muller et al. teaches that wet mill-classifier circuits have been developed which reduces size distribution of the product and especially the coarse material can be reduced (p. 10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use wet milling as taught by Muller et al. in the process of GB '955 to reduce size distribution of the product and reduce coarse material as taught by Muller et al.

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of Carey et al. (U.S. Pat. No. 4,154,608) and Muller et al. (1999).

GB '955 is applied as set forth regarding claims 30 and 40 above.

GB '955 in view of Carey et al. is applied as set forth regarding claim 37.

GB '955 in view of Carey et al. does not disclose recirculation of coarse particles from the separation step to the transformation step.

Muller et al. teaches that in processes where grinding is used in combination with classification, coarse particles are returned to the feed (section 4.2, paragraph bridging pp. 9-10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to return coarse particles as taught by Muller et al. from the sieving process of GB '955 in view of Carey et al., to the feed as taught by Muller et al. for the obvious reason of not wasting materials. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to return the coarse materials to nitriding step before milling, since GB '955 teaches that the nitriding step embrittles the material allowing subsequent size reduction (p. 1 lines 1-20).

Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of Japanese patent 03-090543 (JP '543) or Japanese patent 55-164019 (JP '019) or Naeser et al. (US Patent No. 3,357,827).

GB '955 is applied as set forth regarding claims 30 and 40 above.

GB '955 does not disclose that a separated fraction is collected for sintering purposes (claim 45) or used as an alloying substance in sintered steel production (claim 46).

JP '019 discloses a method of preparing nitrided iron by heating an iron powder in ammonia gas, and using the sintered product as an additive to molten steel (abstract).

JP '543 discloses a method of manufacturing a sintered alloy steel by nitriding an alloy steel with ammonia gas, then pulverizing, compacting and sintering the powder (abstract).

Art Unit: 1742

Naeser et al. teaches that nitrides in alloying steel are advantageous, especially in creating hard wear-resisting surfaces that improve the corrosion resistance of porous sintered parts (col. 1 lines 45-55) and discloses a method for producing nitrided powders (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to separate a nitrided powder as taught by JP '019 or JP '543 or Naeser et al. as an intermediate product of GB '955, since the use of such powder is known in the art for production of sintered products as taught by JP '019 or JP '543 or Naeser et al. and since such powder is produced as an intermediate product of GB '955.

Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of WO 92/14568 (WO '568).

GB '955 is applied as discussed above regarding claim 30.

GB '955 does not disclose heating and milling in a combined step in a rotating tube furnace.

WO '145 discloses a method of nitriding a solid metal using ammonia in a ball mill at temperatures up to 500 °C (abstract) where the milling of metal powders generates a large number of new rough and reactive surfaces and promotes diffusion of the nitrogen in the metal particles (pp. 9-10). The heated mill is the same as a rotating tube furnace with "milling bodies". It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the nitriding/milling process of WO '145 in the process of GB '955, since the combined process of WO '145 promotes diffusion of nitrogen into the metal which is desired in GB '955.

Claims 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of the Metals Handbook Volume 7.

GB '955 is applied as discussed above regarding claim 30.

GB '955 does not teach that the powder is used for injection molding (claim 53) or sintering (claim 54).

The ASM Handbook teaches that injection molding is widely used because of low production costs and ability to create complex shapes. After molding, the powder is sintered. Fine iron powders are suitable for use in injection molding (pp. 355-356). It would have been obvious to use injection molding followed by sintering as taught by the ASM Handbook with the powders of GB '955, since this process creates complex shapes with low production costs as taught by the ASM Handbook, and is suitable for powders such as produced by GB '955. With respect to claim 55, GB '955 discloses steel as discussed above regarding claim 30.

Claims 30, 48-50, 80 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese patent 07-026304 (JP '304).¹

With respect to claims 30 and 80, JP '304 discloses a method to produce iron powder by reducing iron oxide to sponge iron, heating in ammonia gas to nitride, crushing by stamp mill then subjected to denitrification (abstract). JP '304 discloses denitrification at a temperature of 400 to 900 °C (paragraph 0029), which overlaps the claimed range of 250 to 400 °C; therefore a prima facie case of obviousness exists (see M.P.E.P. § 2144.05). It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform denitrification at a temperature of 400 °C since JP '304 discloses equal utility over the range of 400 to 900 °C. In an example, JP '304 discloses a starting material with size distribution of 51.7 wt% -45 microns, 30.5 wt% + 45 microns, 13.9 wt% + 63 microns and 3.9 wt% + 75 microns (paragraph 0034). The fraction of particles (about 10%) between 63 microns and 75 microns (about 13.9 wt% - 3.9 wt% = about 10 wt% between 63 and 75 microns) is within the claimed range of 50 to 500 microns.

Art Unit: 1742

Further, the 30.9 wt% of particles within the ranges of + 45 microns, + 63 microns and + 75 microns overlap the claimed range of 50 to 500 μm , therefore a prima facie case of obviousness exists (see M.P.E.P. § 2144.05).

With respect to claims 48-50, JP '304 discloses denitrification in hydrogen gas at a temperature range of 400 to 900 °C (paragraph 0029). The temperature range of 400 to 900 °C is close enough to between about 300 to 350 °C that one of ordinary skill in the art would expect the same result (see M.P.E.P. § 2144.05).

With respect to claim 82, in an example JP '304 discloses a starting material with size distribution of 51.7 wt% -45 microns, 30.5 wt% + 45 microns, 13.9 wt% + 63 microns and 3.9 wt% + 75 microns (paragraph 0034). The fraction of particles (about 10%) between 63 microns and 75 microns (about 13.9 wt% - 3.9 wt% = about 10 wt% between 63 and 75 microns) is within the claimed range of 50 to 500 microns. Further, the 30.9 wt% of particles within the ranges of + 45 microns, + 63 microns and + 75 microns overlap the claimed range of 50 to 500 μm , therefore a prima facie case of obviousness exists (see M.P.E.P. § 2144.05).

Claims 30, 50, 80 and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Britain patent 922,955 (GB '955) in view of Japanese patent 55-164019 (JP '019)² or Japanese patent document 03-090543 (JP '543).²

GB '955 is applied as discussed above regarding claims 30 and 50.

Alternatively, GB '955 does not disclose the use of finely divided raw material selected from one of the group of iron powder, sponge iron, iron oxide powder and steel powder, where the particle size is about 50 to 500 μm .

¹ Based on machine translation to English.

² Based on USPTO translation to English

JP '019 discloses a method for nitriding iron oxide powder with particle size of 10 mesh or smaller (i.e. about 1,700 μm or smaller) by reduction followed by nitrification in ammonia gas (JP '019 claim 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use iron oxide powder as taught by JP '019 as a raw material in GB '955 since JP '019 discloses nitrification of such powder by a substantially similar method (nitrification by heating in ammonia gas). The range of smaller than 10 mesh (i.e. about 1700 μm) overlaps the claimed range of 50 to 500 μm , therefore a prima facie case of obviousness exists (see M.P.E.P. § 2144.05).

Alternatively, JP '053 discloses nitriding alloy steel powder with particle size 100 μm or smaller by heating in nitrogen or ammonia (JP '053 claim 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use alloy steel powder as taught by JP '053 as a raw material in GB '955 since JP '053 discloses nitrification of such powder by a substantially similar method (nitrification by heating in ammonia gas). The range of smaller than 100 μm overlaps the claimed range of 50 to 500 μm ; therefore a prima facie case of obviousness exists (see M.P.E.P. § 2144.05).

Response to Arguments

Applicant's arguments filed 04/05/2007 have been fully considered but they are not persuasive.

Arguments regarding maintained rejections are summarized as follows:

1. GB '955 leads away from the present invention insofar as the difference in choice in raw material as well as differing temperature in the denitriding step.
2. The criticality of temperature is discussed in the paragraph at the bottom of page 5 of the present application where it is indicated that no agglomeration at all occurs below about 350 °C.

3. The secondary references JP '019, Carey et al., Muller et al. article, JP '543, Naeser et al., WO 92/14568 and the ASM Handbook do not make up for the differences in raw material or temperature range in the primary reference GB '955.
4. In addition, Examiner looks to applicant's own disclosure to piece together bits and pieces from the prior art references to allege obviousness.

Examiner's responses are as follows:

1. GB '955 discloses although GB '955 does not specifically recite that finely divided steel turning scrap is treated by the invention, GB '955 discloses nitriding steel sheet scrap in general, therefore finely divided steel turning scrap would be within the scope of the disclosure. Examiner does not agree that the general disclosure of thin steel scrap in GB' 955 leads away from finely divided steel turning scrap. Although GB '955 discloses a higher temperature for the denitriding step, reduction of temperature would have been an obvious modification at the expense of longer denitriding times. Further, it is well settled that where the principal difference between a claimed process and that taught by reference is a temperature difference, it is incumbent upon applicants to establish the criticality of that difference (Ex parte Khusid, et al., 174 USPQ 59).
2. The discussion in the bottom paragraph of page 5 of the present application is a conclusory statement, and does not take the place of evidence (e.g. comparative test data). Applicant may submit an affidavit or declaration in accordance with 37 CFR 1.132 to present evidence traversing this rejection. Further, it is unclear how the statement that no agglomeration at all occurs below about 350 °C provides evidence of the claimed criticality of the range of between about 250 and 400 °C.
3. JP '019 discloses reducing then nitriding a starting material of iron oxide powder with a particle size of 10 mesh or smaller (JP '019 claim 2). JP '543 discloses nitriding an alloy steel powder with particle size 100 μ or smaller (JP '543 claim 2). Naeser et al. discloses nitriding alloy steel powder (columns 1 and 2). WO '568 discloses nitriding a metal powder (abstract).
4. It must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account

Art Unit: 1742

only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM

06/27/2007 *Yhm*

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